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ANNUAL REVIEW OF THE METAL TRADE.

It not unfrequently happens that some of the phenomena of nature are represented in the commercial world, and as it has lately happened that the terrible earthquakes which have taken place in South America have reacted in a modified measure upon other countries far removed from the original scene of the calamity, so it has occurred that the great convulsion which shook the commerce of the country two years ago has caused its effects to be felt even up to the present time; and thus the trade of the year 1868 has felt the depressing influences of that most disastrous period, the consequence of which has been that business has been far from attaining that vigorous position which it held in former years; and it is only as the year has been drawing to a close that the commerce of the country seems to be recovering from the blow which it had received, and once more putting forward its strength for resuming again that activity which formerly characterised it. However, it is a matter of great satisfaction that this is the case, and that at the conclusion of the year we are not called upon to mourn over the decay of commerce and the general depression of trade, but can rejoice that we have now passed through the trial, and are emerging upon scenes of returning trade and improved business, while the prospect presented to us is extremely gratifying, and leads to the assured hope that we shall soon again return to those vigorous and prosperous times which formerly shone upon the commercial world, and there is every reason to anticipate that the year upon which we shall soon enter will be one of those bright years in the history of the commerce of England which will make up for those periods of depression which have lately been passed through. It is very satisfactory also to find that confidence, which had been so severely shaken during the crisis, and which for a long period seemed entirely to have disappeared, has during the present year been gradually returning, and seems now to be almost fully re-established; and upon this depends greatly the prospect of future prosperity, as without confidence it is quite impossible for trade to be carried on to a successful issue.

The year 1868 has not been very fruitful in events of great interest bearing upon commerce. Among the principal, however, of those that have occurred has been the sharp contention which took place in the United States between the President and the Congress, which led eventually to the impeachment of the President upon various charges. Fortunately, however, this fell through, and the attempt of the Republican party to remove the President from his office, in order to place one of their own friends in that position, was thwarted by their failure to secure a sufficient majority in the Senate to carry the impeachment measure. We consider that it was fortunate for themselves that they were unsuccessful, as it would only have brought odium and disgrace upon the party had they proved triumphant, and perhaps have seriously interfered with their late success in securing the election of General Grant to the Presidency. It is to be hoped now that the excitement which has continued so long to exist, both regarding the impeachment of President Johnson and the election of the new President, has subsided, that the energies of the people will be once more turned towards the prosecution of trade, and that our commercial relations will again go forward with mutual reciprocity and advantage. It was very gratifying to find from the statement of the American minister, Mr. Beverdy Johnson, that all causes of misunderstanding between the two countries was at an end, and that the settlement of all claims on the part of the United States against England was being arranged upon a basis consistent with the honour of both countries; and we trust that for the future nothing will arise to interfere with the good will and friendly feeling which ought ever to exist between the United States and this country.

Rumours have again prevailed of war between France and Prussia, but, fortunately, up to the present time these rumours have not been supported by facts. These two great countries still remain at peace; and though there may be some jealousy on the part of one of them against the extension of the empire of the other, yet it is to be hoped that the wisdom of the Emperor Napoleon will prevent this feeling being carried out into actual warfare; and from the statements which have been made by the ruling powers of both nations, it seems not likely that war will break out, unless some unforeseen cause should arise which should render peace between the two countries no longer desirable. Fortunately, however, we trust that war may not again take place on the Continent, as it is always detrimental to the true interest of nations, and always very seriously interferes with the progress of commerce, and the development of national resources.

One great event which ought not to be omitted in reviewing the events of the year is the conclusion of the Abyssinian war, which was brought to so successful and happy a termination by Lord Napier; and which, perhaps, is without precedent in the whole history of warfare; and it shows clearly what can be achieved by modern science, when directed by one who thoroughly understands his resources, and who will not swerve from the object to be attained by any difficulties which may be presented, however great; and who also has a regard for the lives committed to his charge, and will not recklessly throw them away, as has so often been done, not only in former wars, but especially in one which has only recently occurred; and it also clearly proves that whenever England requires able men to direct her affairs, of whatever kind they may be, that those men are always to be found.

The last topic to which we have to refer is the great and important revolution which has taken place in Spain, than which, perhaps, nothing more momentous has happened in the history of that country. The superstition and oppression which had so long reigned there have been at once shaken off, and liberty of religion and speech has been accorded, while the freedom of the press has been secured, and other important and valuable changes obtained. The nation seems to have sprung forth from the darkness which had surrounded it, and leaped at once into the light, and is now prepared to take its stand amongst the enlightened nations of the world, and to take its part in the commonwealth of nations. There is little doubt that eventually it will be found that this change has been most important to the commerce of the country, and that the national resources will be largely developed, and the trade of the country greatly extended and enlarged.

One remarkable feature in the year has been that up to Nov. 19 the Bank rate of discount has remained at 2 per cent.; this is a most unprecedented circumstance, and has tended greatly to prevent the depression which has existed from becoming greater. Had times been as formerly this circumstance would have afforded great facilities for operations, especially as there has been plenty of capital waiting for investment as soon as any eligible opportunity presented itself. Unfortunately, however, confidence has not been sufficiently restored for these facilities to be made available; but as business began to improve, and money to be more freely invested, and commercial operations became more extended, an advance in the Bank minimum became necessary, and accordingly on Nov. 19 the Bank rate of discount was advanced to 2½ per cent., and again on Dec. 3 to 3 per cent., at which it still remains. These advances are, however, a proof of the improved state of trade, and that capital is more required for extending operations; and the rate is still so low that no hindrance whatever is placed in the way of business, but only such as may legitimately be expected to be charged for such facilities as are sought in the way of business.

Altogether we look back upon the closing year with mixed feelings, partly of regret that trade has been to so great an extent depressed, and partly with satisfaction that the depression has now been so far overcome, and that, notwithstanding all, the stability of our commerce upon a firm and substantial basis has been fully exemplified. We look forward with confidence to the new year, believing that it will show a return to activity in trade, and that once more we shall behold the commerce of the country not only vigorous as formerly, but largely extended, and increasingly prosperous.

COPPER.—Throughout the year the market for this metal has been in a depressed condition, and prices have ruled much lower than they have done for many years past; indeed, we think we are not incorrect in stating that never in the history of the Copper Trade have prices been so low and unremunerative. However, towards the close of the year a rather better prospect has dawned upon the trade, the demand has decidedly improved, prices have become firmer, and there appears every reason to look for advances taking place ere long. In January the market for this country from Chili was equal to about 2500 tons, which large quantity caused the market to become depressed, and prices to be lowered. Chili bar was then sold at 67½. Further advices of another 2000 tons being shipped from Chili caused prices still further to decline, and the market remained exceedingly dull. Towards the latter part of the month, however, the market became rather firmer, and Chili bar was sold at 70½, and Burra at 82½; and, in fact, from Chili reporting a reduced rate of shipment, the market assumed a steadier tone, and prices became decidedly firmer. In February the improved feeling in the market continued, and it became impossible to purchase at the prices formerly ruling. A better enquiry also arose, and Burra was sold at 83½. The advices from Chili reported shipment of 1400 tons copper, and the market still remained steady, and prices firm, but business was by no means active. About the close of the month English tough cake was offered at 73½, but without being readily placed, and Chili bar sold at 70½ to 70½. In March the advices from Chili reported shipment to this country for 1650 tons copper, and the market advanced to 74½, and though the demand was not great, English also became much firmer. The next advice from Chili reported shipment of 1080 tons, and the market continued steady. No transactions of importance, however, occurred except in Chili bar, in which business was done to the extent of about 2000 tons, at 76½. The next advice from Chili was for 1110 tons copper, the market continuing quiet. In June, at the commencement of the month, the market was without important transactions. About the middle of the month considerable quantities of Wallaroo were placed on the market for immediate sale, and the price was thus forced down to 80½, but a reaction afterwards took place, and the price rose to 80½, 81½, Chili bar was sold at 76½. The market continued during the remainder of the month to be quiet, and comparatively little business was done. In some instances sellers gave way in price, that they might secure orders. Wallaroo was sold at 80½, 80½, and Chili bar at 73½. In July the advices from Chili reported shipment of 1723 tons copper. English remained quiet, and rather lower prices were accepted. This state of things continued throughout the month, and comparatively little business was done. Smelters still showed a disposition to meet buyers in price, in order to secure business. Wallaroo was sold at 79½ to 79½, and Chili at 68½. In August the market remained very quiet, and business was exceedingly limited; but towards the middle of the month it became a little easier, and there was rather less disposition to sell at the prices at which business had previously been done. Wallaroo was in rather better demand, and sales took place at 79½ to 79½, and Chili at 67½ to 67½. The next advices from Chili reported shipment of 3100 tons copper, which caused the market to remain very quiet. At the close of the month the market continued dull, and the amount of business done was small. Prices of English were a trifle easier, and tough cake was sold at 72½, 73½, and Chili bars at 67½ to 67½. In September no improvement occurred in the market, and prices remained without change, the transactions being only of a trifling character. Towards the middle of the month, however, there appeared some hope that the depression which had so long continued was about to pass away, and a more satisfactory state of business to return. The importation of ores into Swansea was considerably above the average of many months past, and trade at the various smelting works was more brisk than lately. Prices also became firmer, especially for manufactured. In October, however, the demand was not so good, and sellers were, consequently, obliged to submit to lower prices. This state of things continued during the greater part of the month, but towards the close the market assumed a brighter appearance, and prices became decidedly firmer. This arose partly from the lighter shipments which occurred from Chili, and partly, also, from an improved demand. English tough cake was sold at 74½, and Chili bar at 69½ to 70½. Wallaroo was quoted at 78½, 79½ to 79½. In November, however, the market was without important transactions, and prices remained without change. Operations in Wallaroo, of a speculative character, have taken place to the extent of between 200 and 300 tons, at prices varying from 79½ to 79½, 15s. cash, and 80½, 10s. prompt three months. Chili bar was sold at 68½ to 68½. About the middle of the month the standard of ores at Swansea was reduced 3s. per ton, and prices became rather less firm. Considerable sales of Chili bar took place, amounting to from 300 to 1000 tons, at 67½ to 67½, 10s. As the month advanced, however, the market became a little firmer, and there was less disposition on the part of smelters to sell at the prices they had lately done. There was, also, a better enquiry for Chili, and considerable sales took place at 69½, 70½ to 70½. In December the market continued quiet, and no transactions of importance occurred. Chili bar was sold at 69½, and Wallaroo at 79½. Towards the middle of the month, however, a marked improvement took place in the market, a much better feeling arose, and a really considerable business was done at advanced prices. The most important feature in the trade was the re-establishment of the old combination of English smelters, who again united to fix prices, and not to undersell each other; and this will greatly tend to make prices not only firmer, but more uniform.

IRON.—In Staffordshire, the Preliminary Meeting of the South Staff-

fordshire and East Worcestershire ironmasters was held at Birmingham, at which it was decided to make no alteration in prices or wages. The demand was small, and the works were generally short of orders. The demand from the East Indies, mainly for railway purposes, was now the most important stay of the trade, but for general merchant iron the enquiry was slack. Some of the smaller makers, who worked for the local demand, were fairly off for orders, but the great works, with few exceptions, were doing very little. In February, the orders received were still comparatively few, and little or no improvement occurred in the trade. Prices were generally easy, and there was no difficulty in getting orders executed by second-class makers at almost any reasonable terms. Towards the close of the month, however, there was a slight improvement in the demand for manufactured iron, and it was hoped that the opening of the navigation of the Baltic and Canadian waters would cause a continued increase in the demand to be experienced. The recovery in the shipbuilding trade also increased the demand for plates. In March, the makers who had an established connection with the home markets received orders somewhat more freely, but the demand had not yet become general. Towards the middle of the month, however, there was a slight improvement in the trade, but it was not sufficiently marked to relieve the smaller houses from the strain which they had long felt. On the 26th, the Preliminary Meeting of the ironmasters was held at Birmingham, when it was resolved that the price of bar iron be reduced to 7½ per ton, and the puddlers' wages be reduced 1s. per ton, and other wages in proportion. The workmen were to receive notice on the following Saturday. In April, the advices from Australia became more favourable, both as to actual orders and expectations for the future. The China trade was also better, and although the improvement is slow in the East Indies, the tendency is in the right direction. The result of the quarterly meetings did not encourage the expectation of any speedy improvement in the state of the trade. The consequence of the notice of the reduction in wages was that the men struck. It was not, however, expected that the strike would last long; still it very much interfered with business, and it is very much to be regretted that some plan cannot be adopted, with the consent of both masters and men, by which these deplorable strikes might be prevented, and a fair rate of wages established. Towards the close of the month the reduction in prices had caused the leading ironmasters to receive rather more orders, and there appeared a prospect of a better demand had there been no strike. At some of the works the men had returned to their employment, and at others they were soon expected to do so, while at some they were still determined to hold out. In May, there were more enquiries for rails, especially for Russia and the United States, and a slight degree of improvement appeared in the home trade. A good many contracts which usually came to Staffordshire were now said to be taken in Belgium. Many of the puddlers still continued to refuse to return to work at the reduction, but others had gone in; and in consequence of the continued strike some orders which had been given out were cancelled, and placed elsewhere, but there was no marked improvement in the demand. Complaints were very general of the reduction of prices. Towards the close of the month the men were gradually resuming work. In June, a good demand existed, but the strike of the puddlers, which still remained in an unsatisfactory state, greatly interfered with business, and caused considerable inconvenience in consequence of the uncertainty as to time of delivery. About the middle of the month the Central Committee of Ironworkers formally agreed to leave the men to make the best terms they could with the masters, so that the strike might then be considered at an end, and all the men would be soon at work, for whom employment could be found. A steady demand now set in, and as the railway companies were gradually coming into the market, it was hoped that the improvement would continue. In July, as was anticipated, the ironmasters at their Preliminary Meeting, held at Birmingham, confirmed the list prices of 7½ for bars at the works, and other descriptions in proportion. A good demand continued to exist, and the export trade was especially brisk. Orders continued to be given out for America, India, and the Continent, and the home trade was rather favourably affected by the settlement of prices at the Quarterly Meeting. The extreme heat of the weather which prevailed at this time greatly interfered with the execution of orders, as it was impossible for the men to work any length of time, and it was feared that if the heat continued much longer that great difficulty would arise in getting orders up to time. In August a moderate supply of orders continued to be received, and as the weather continued excessively hot there was some slight degree of pressure in the completion of orders. Towards the middle of the month, however, the weather became cooler, and orders began to come in steadily, and the men were enabled to work with greater ease. Most of the works were now able to keep the men employed full time, and there was a general expectation that the improvement would prove permanent. The railway companies now began to order rails and other sorts of iron, and it seemed clear that prices would not be lower. In September a steady flow of orders set in, though generally of small amount, and most of the works, though not busy, were fairly employed. Prices were a shade firmer, and there was a decidedly hopeful feeling for the future. The home demand was now moderately good, and there was a tolerable flow of orders from the East Indies and other foreign markets. Several works which had been closed for some time were again started. As a rule, the works were in nearly full operation. At the Preliminary Meeting of the ironmasters, held at Birmingham, the attendance was numerous, and the question as to future prices was discussed at some length. The general feeling of the meeting was that although there was an undoubted improvement in the trade as compared with three months before, yet it had not attained such a position as to justify any advance in the list prices. It was, therefore, unanimously resolved to adhere to the old scale of prices for all descriptions of manufactured iron. In October the orders given out for rails had the effect of imparting a firm tone to the market, and enabled the masters to command increased rates; they were now fairly supplied with work, and there seemed a prospect of prices being well maintained. The orders now coming in were moderately good, and the greater part of the works were in as nearly full time as is usual, except when there is an accumulation of orders. In November the works were generally well employed, and orders came in pretty freely; there appeared every prospect of a still improved demand, and of a good business being soon done. Most of the works were now tolerably well employed, and orders were such as to lead to the belief that the demand would carry the trade fairly through the winter. The cessation of orders for shipment to the Baltic did not prevent the continuance of a good demand, and a much greater activity was expected in the spring. The number of orders from the United States led to the anticipation of considerable requirements from that country. In December there was rather a falling off in the number of orders, and manufacturers were apprehensive that unless there was a decided improvement the works would have to be put on short time. Prices still kept low, and buyers were unwilling to give any advance upon former prices. There were now about a dozen more works engaged in manufacturing than before the strike, which, of course, made a considerable addition to the production. The books of makers were now pretty clear, and merchants appeared to have replenished their stocks, and to be disposed to wait until the turn of the year before giving out fresh orders.

In Welsh, at the commencement of the year the result of the Quarterly Meeting of the Staffordshire ironmasters did not realise expectations, as, although no reduction in the price of iron was considered probable, yet many believed that a resolution would be made to reduce wages 5 to 10 per cent., and undoubtedly the position of the trade fully justified such a course. The number of hands continued to be reduced at several of the establishments, which was a proof of the dulness of the trade. The demand was not good, and both for the home and foreign markets the enquiry was remarkably small. The men accepted the proposed reduction in wages, which was of an average of 10 per cent. As the month progressed prospects did not brighten; but although actual business was extremely limited, there was expectation that as the year advanced business would improve. At several of the works the men were not employed, and dulness generally characterised the trade. In February no improvement occurred, and the trade appeared to be in a worse position than it had been for 20 years. Many of the makers, however, believed that the worst was past, and that before long there would be a gradual movement. Public confidence being somewhat restored in railway securities, it was hoped that the home companies would soon be in a position to purchase rails and other materials, of which they were much in want. Shipments of rails were made to the United States, and it was expected, if no political contentions arose, that some large orders would be sent from that country. No improvement, however, took place in the trade during the month, and the dulness which rested upon the trade was in no respect modified. Short time was now the rule at most of the principal works, and although the reduction in wages had been carried out, it did not seem to have any effect in stimulating the demand. Railway iron, however, was being shipped to some considerable extent to the United States. To all other foreign markets the clearances were small, and there was no movement whatever in prices. In March, although there was more confidence evinced in the future of the trade, actual transactions did not make any advance. Iron freights were

already in the market for Russia, and there was every probability that the requirements of that country would prove in excess of the previous year. The exports for the past month were stated at 8108 tons, of which New York alone took 6182 tons. Home engagements now slightly increased. In April the tendency to improvement was making slow progress, but so far as actual operations at the works were concerned, it was hardly perceptible. Preparations were made for a considerable increase in exports, principally to the United States and to Russia, the demand from both countries being expected to increase. Additional contracts on home account were now being offered, which was considered a proof that the general trade of the country was recovering from its long prostration. The exports for the past month were stated at 5154 tons, of which New York took 3725 tons. Towards the close of the month the ironmasters were able to keep their works in better employ than they had done for some time, and there were indications of a return to prosperity. There was an increased demand for rails, principally for the United States, the advances showing that stocks were low, and large supplies almost certain to be required. Home buyers now appeared to consider it important to place contracts without delay, so as to secure the advantages of the present low prices.

In May the unsettled state of trade in other districts checked to some extent the tendency to improvement which had set in, both makers and buyers being more cautious in entering into engagements than they would otherwise have been. The export trade showed a gradual increase, and the orders coming from the United States and Russia indicated that a tolerably good foreign business would be done during the next few months. Towards the middle of the month, however, the trade showed more quietness, and the orders were not so numerous. The advances were received, but there was no general improvement as to the future, the requirements of the leading railway companies in that country being large. The exports during the previous month were reported as 14,620 tons, of which New York took 7885 tons. Continental engagements now became more numerous, but on home account specifications were not offered with the freedom which was expected, financial considerations being believed to be the cause why buyers were so backward. In June some of the leading works were somewhat better employed, the shipment of rails to the United States, and to several other foreign markets, having increased. Russian advances were considered favourable, but there was a large business doing with that country. Home transactions were slowly increasing, both in number and quantity, and several of the railway companies were in the market with rail contracts. The weather now beginning to be hot rendered it difficult for some of the operations at the works to be carried on, and had the demand been good there would have been some inconvenience experienced in the execution of orders. In July quotations were somewhat better supported, and it was expected that during the ensuing quarter there would be less underselling than usual. The clearances for the foreign markets were considerably larger, and the demand for rails to the United States. Home engagements were being offered a little more freely, and several of the railway companies were gradually increasing their purchases. The exports were now unusually large, the total clearances for the last month reaching 21,649 tons. A rather better feeling was evinced in the trade, consequent upon the favourable tone of the Quarterly Meeting, but the actual orders on the books showed only a small increase. The exports to the United States continued on a tolerably large scale, and Russian engagements were somewhat larger. Home business was quiet, and the railway companies were slow in making additions to their purchases. The continued heat of the weather rendered it difficult to check operations at the works, and at several of the establishments water was scarce. To the Russian ports shipments were increasing, but they did not come up to those of the last year. Continental enquiries were encouraging, the extension of railways in Hungary and elsewhere promising a considerable addition to the demand. Home engagements were somewhat more numerous, but they were not generally large. In August the works were still troubled for want of water, and the consequence was that operations were much reduced, and great difficulty was found in completing orders. The export of rails to America was being retarded, and the demand for rails from the Continent was only slightly increased, but encouraging advances as to the future were received. The better feeling in the home trade was sustained, and as the stocks in the hands of buyers were low, there was a prospect of gradual improvement. Towards the middle of the month the change in the weather enabled operations to be carried on more regularly at the works. The orders on the books were small, but there were indications of a better demand gradually springing up. Clearances on American account were still considerable, and enquiries for the Continent slightly improved, though as a rule business continued to be small. The exports during the previous month reached 8147 tons. The signs of improvement now became gradually more evident, and home buyers began to enter the market with greater freedom. On American and Russian account there was a fair business doing. Towards the close of the month the continued change in the weather enabled operations at the works to be carried on with more regularity than for some weeks past, and the mills and forges were fairly employed. The rails manufactured were principally for American markets, and the advances were considered favourable as to future requirements. From the Continent the enquiries were few in number, but there was a fair prospect of an increase in the demand. In the home trade the iron and steel was fully maintained, and considerable engagements were expected to be entered into before long. In September the demand continued to improve. Home buyers began to purchase with greater freedom, and there were indications of a substantial improvement, both as regards requirements and prices. In the plate branch of the trade there were evident signs of returning vitality, and there was a probability of the mills being shortly better employed. The clearances for the foreign markets now began to increase, and on American account buyers evinced a little more freedom; but with South America and the East Indies there was hardly any trade doing. The exports during the last month reached 14,721 tons, of which Cronstadt took 3271 tons, New York 2963 tons, and New Orleans 2661 tons. The railway companies also began to enter into transactions with more freedom. Quotations for rails now became firmer, and there was a prospect that a substantial advance would be established ere long. In October the trade seemed to be gradually recovering from the depression which had prevailed during the last two years, and the improvement which had lately set in was fully maintained. The hands at the leading works were fully employed, and additional orders were being received. Home buyers now began to purchase with something like freedom, and contracts were more numerous than they had been for many months. Shipments of rails continued to be made to Russia, America, and the British colonies, and continental enquiries were much better. The Russian season became closed towards the latter part of the month, and there remained on the makers' books uncompleted orders for a considerable amount. During the last month the exports reached 12,118 tons. Advances from the United States continued favourable. Home contracts were now more sought after, to make up for the cessation of Russian orders. Towards the close of the month the shipments were being received, and the demand upon the closing of the Russian season, and the clearances for the United States were quite so large. American advances were not unfavourable as to future requirements, but until the Presidential election was over it was expected to remain stationary. Continental enquiries showed no material change, but there was a tendency towards improvement, and home engagements were more numerous. In November the principal works were tolerably well employed, greater regularity being evinced in operations than had been the case for a long time. There was as yet no substantial improvement in prices, but there was less underselling, and if the expected orders from the American and continental markets came to hand it was fully expected that the result would be an advance in the quotations. Clearances for the United States were somewhat less, although still considerable, the exports consisting almost exclusively of rails. Continental engagements were coming in slowly, but with the extension of railways in Austria, Spain, and other countries there was a prospect of an increased demand. Prices now began to be very firm, and makers refused to accept orders for delivery next year at present rates. Large quantities of rails were also shipped for South America, and there were several good orders on the books for that country. From India the advances were more encouraging, and there was a prospect of trade with that country improving. The rail mills now continued busier than they had been for a long time. Prices remained firm, and many makers refused to accept contracts for delivery next year at present prices. Home enquiries were more encouraging, and to the United States shipments were steadily increasing, the total sent during the present month being 14,093 tons. Towards the close of the month a little slackness was caused by the elections. Transactions on American account, however, increased in number, but that the Presidential election was over. In December operations were rather interfered with by the county elections, and some of the works were practically stopped in consequence of the absence of hands. Some South American engagements were now being completed, and there were considerable orders on the books for railway iron for the United States. Home business was moving, the advance in the rate of discount being a proof that a larger capital was required for trade operations. Towards the middle of the month the works began to assume their usual regularity, and the mill and furnaces were tolerably well employed. Makers were not now disposed to make heavy engagements, except at enhanced prices, as there was a general belief that the demand of the next year would witness an advance in quotations. The American demand kept tolerably good, and out of a total of 10,702 tons exported during the previous month the markets of the United States took 5645 tons. Business on continental account remained the same, and until the new year it was not expected that buyers would enter into large transactions. The adoption of a less restrictive commercial system in Spain had been the means of causing larger shipments to that country.

In Swedish iron, at the beginning of the year, the demand was only moderate, which continued throughout the month, and until the opening of the ports again there was not likely to be much enquiry. About the middle of March, when the navigation became open, there was a little movement, and several parcels began to arrive from Sweden. The market, however, had not yet become very active, and holders were not very firm in their prices. Towards the end of April, however, the market assumed a rather more active appearance, and several parcels changed hands, still only a moderate business was done. In May, however, much more activity was evinced, and a better demand existed. In June a less active state of things returned, there was a general slackness in the market, and prices became a trifle easier. About July the market again improved, a very good enquiry existed, and several sales took place. This continued throughout the month, and the following month, a good business continued to be done, and prices were well maintained. In September a further improvement occurred, considerable activity prevailed, and a large business was done, and prices remained very firm. This state of the market continued throughout the month, business was very abundant, and parcels arriving rapidly, found buyers, and prices became still firmer. In October, however, there was a little less enquiry, but prices did not give way, and as the season for shipments from Sweden was then drawing to a close, it seemed not unlikely that greater business would still prevail. Towards the close of the month the demand slackened. In November the demand still remained only moderate, and sales became unfrequent. In December there was very little activity, and as the ports are closed, it was not expected that the demand would materially improve until the spring of next year, when, in all probability, there would again be an active business.

In Scotch pig-iron the market was not very active when the year opened, the price standing at 52s. 6d. cash; as the month advanced the price gave way to 51s. 6d. cash, but towards the close of the month a more active condition of the market arose, and considerable business was done at the advanced price of 52s. 3d. cash. In the following month a further improvement occurred, and the price again went up to 52s. 6d. cash, at which a good business took place; again, however, it went back to 52s. 3d. cash; towards the close of the month, however, the price again rose to 52s. 6d. In March, although only a moderate business was done, the price further advanced to 52s. 9d. cash, and afterwards to 52s. 11d. cash. A little more speculative feeling now arose in the market, and a good business was done in warrants, the price advancing to 53s. 3d. cash;

afterwards, however, a decline occurred, and the price went down to 52s. 10½d. cash. In April little animation occurred in the market, and the price further declined to 52s. cash, and again, as no better feeling manifested itself, to 52s. 4d. cash; and towards the middle of the month, as the market continued inactive, to 52s. 3d. cash. In May there was little or no change in the market, and few sales of importance took place, the price falling to 52s. 1d. cash, and then to 52s. cash. In June the market at first revived, and business was done at 52s. 10d. cash, but soon began again to decline, first to 52s. cash, and then to 51s. 6d. cash; about the middle of the month, however, the market assumed a rather more cheerful tone, and rather more speculative feeling existed; the price gradually advanced to 51s. 9d. cash, and then to 52s. 1½d. cash; towards the close of the month an unusually active state of the market was manifested, and a very extensive business was done; prices advanced to 52s. 9d. and 52s. 10½d. cash, and 52s. 11d. and 53s. one month. In July a good business continued to be done, and the price increased to 53s. cash; afterwards, however, rather less activity prevailed, and prices went down to 52s. 7½d. cash, and 52s. 10½d. one month; the market then became again quiet, and the price declined to 52s. 6d. cash; towards the close of the month, however, rather more activity prevailed, and the price advanced to 52s. 9d. cash, and 52s. 10½d. one month. In August the market was very quiet, and the price went down to 52s. 6d. cash, at which it remained with little variation until the latter part of the month, when a better feeling arose, and a good business was again done, prices going up to 52s. 3d. cash, and 53s. 6d. one month. In September there was a further improvement, and prices varied very little during the month, and a moderately good business continued to be done. In October the market again became quiet, a moderate business only being done, and the price gradually went down to 52s. 9d. cash; as the month advanced, however, more activity prevailed, and at one time the price went up to 53s. 6d. cash, but did not long remain at this figure, but soon began again to drop, and went down to 53s. 3d. cash, and then, the market becoming inanimate, to 52s. 10d. cash. In November there was not much fluctuation in the market, quietness generally prevailing, and prices continuing with little change at 52s. 10½d. to 53s. cash, and 53s. 1½d. to 53s. 3d. one month; as the month advanced, however, a rather better feeling arose, and prices advanced to 53s. 6d. cash, and 53s. 8d. to 53s. 10½d. one month, and afterwards to 54s. cash, but then declined, and business was done at 53s. 9d. cash, and 53s. 10d. one month. In December the amount of business transacted was only limited, and the price declined to 53s. 6d. cash; it afterwards went up for a short time to 53s. 7½d. cash, but soon declined again to 53s. 6d. cash, the market continuing quiet. The very little, sometimes being 53s. 7½d. cash, but generally returning to the old price of 53s. 6d. cash.

LEAD.—At the commencement of the year the market was not in a very flourishing condition, a limited business only being done, and prices remaining rather easy, common English pig having been sold at 187. 15s.; a rather better feeling, however, soon manifested itself, and a fair amount of business began to be done, common English pig advancing to 197. 15s.; as the month advanced this improvement continued, and common English pig advanced to 197. 15s., and towards the close of the month a very fair amount of business was done, a decided improvement in the demand occurred, and prices became very firm. In February a fair amount of business was done, and prices were well maintained. The demand of things continued throughout this and the following month, but in April the demand was not so active; prices, however, remained firm, and sellers were not disposed to make any concessions. In May, however, as no improvement occurred in the market, and the demand remained only moderate, prices became somewhat less firm; towards the close of the month, however, an improved demand arose, and prices again became firm. In June a rather better enquiry existed, and a fair business was again done; but as the month advanced the market again became quiet, and prices less firm. In July the market was rather quiet, and prices advanced a little, but the demand was not so active; the market continued quiet, although there was rather more disposition to do business, and some transactions occurred in favourite brands for export to the East; at the close of the month the market became steadier, and prices were tolerably firm. In August the demand was only limited, and prices were somewhat easier; but soon a better business was done, especially for the United States; prices, however, did not alter; at the close of the month the market was steady; the amount of business done, however, was only moderate. In September a fair amount of business was still done, and prices were well maintained. In October the market was quiet, and prices were not so active; the demand for Russia, America, and China continuing good, sellers succeeded in obtaining slightly enhanced rates, and it was expected that the disturbances in Spain would in some measure interfere with the supplies from that country, which might, should there be any serious falling off in them, cause a rise to take place here. As, however, affairs in Spain became speedily settled this rise did not occur, and as the article was not now much required for, a moderate business only was done; but prices did not undergo any change. In November the market remained in much the same condition, sellers still being in the market, and the demand was not so active; a little more active, and prices were a little firmer, but still the amount of business transacted was by no means large.

TIN.—In January there existed but little enquiry for Straits, and the price stood at 87. 15s. Very trifling business was done, and little disposition was evinced to enter into transactions. In February, however, a decided improvement occurred in the market, and the price of Straits went up from 17. 10s. to 17. 10s. per ton, sales being effected at 87. 15s. to 88. 10s. to 89. 10s. for arrival. In Holland the price of Banca was 52½ fls. cash, and 53½ fls. ex the next sale. The stock of Banca in warrants on Jan. 31 was 144,459 slabs, against 120,569 slabs same time last year, and the arrivals towards the next sale were 43,779 slabs, against 37,229 slabs same time last year. This improved condition of the market continued, and business to a considerable extent was done at advanced prices, 89. 10s. to 90. 10s. being paid for parcels on the spot, and 90. 10s. to 90. 10s. for arrival. 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varied from that of 61. 17s. per bottle, and as the article is now entirely in the hands of one large house no variation is likely to take place.

THE SCOTCH PIG-IRON TRADE OF 1868.

During the past 12 months the Scotch Pig-Iron Trade has experienced unexampled quietness, both in the demand and in the fluctuations of price, English iron coming forward in such quantities as to prevent speculation from influencing injuriously the progress of the trade.

The year on which we have just entered gives promise of greater activity, as the extension which is taking place in railway enterprise in continental and foreign lands cannot fail to influence the price of pig-iron during the period of their construction. It is to be regretted, however, that our coastwise shipments and railway deliveries again show a considerable falling off—48,000 tons compared with 1867, 77,000 tons compared with 1866, and 111,000 tons when compared with 1865; whilst there has been imported into Scotland during the year 153,500 tons English pig-iron, against 71,500 tons in 1867—a convincing proof of the strong and increasing opposition which we now experience in our home markets from the Yorkshire and hematite districts. On the aggregate foreign shipments show a slight decrease, those to continental ports, with few exceptions, compare favourably, whilst those to the United States and British America show a considerable decrease.

While this is the case, we believe that when greater activity takes possession of the trade, and clamorous demands are made for increased wages by the workmen, such activity will not be checked by any great increase in the cost, as there is the promise of so many scientific improvements being introduced to cheapen and enlarge the production, that we may look forward with confidence to a further development of this great branch of industry.

The Committee of the Glasgow Association of Iron Merchants and Brokers, in their annual statement, give the following as the state of production, consumption, and stocks for the year just closed:—

PRODUCTION.		1868.	1867.
Returns from all makers, except the Carron Co.	Tons	1,042,000	1,002,000
Carron Company's make, estimated	..	26,000	29,000
Total	..	1,068,000	1,031,000
Increase	..	Tons 37,000	
CONSUMPTION.		1868.	1867.
In foundries	Tons	208,000	264,072
In malleable works	..	179,800	156,190
Total	..	387,800	420,262
Decrease	..	Tons 32,462	
Quantity of bar-iron made—1868, 179,626 tons; 1867, 143,820 tons.			
EXPORTS.		1868.	1867.
Foreign	Tons	324,018	338,364
Coastwise	..	238,922	254,913
By rail to England	..	22,260	54,461
Total	..	585,200	647,738
Decrease	..	Tons 62,538	
STOCKS.		1868.	1867.
In Messrs. Connal's stores	Tons	269,261	269,140
In Forth and Clyde Canal Company's stores	..	16,268	16,904
At maker's works, from returns received from all except the Carron Company	..	182,474	161,956
Carron Company's stock, estimated	..	100,000	85,000
Total	..	568,000	473,000
Increase	..	Tons 95,000	

These returns show an increase of 37,000 tons when compared with last year, whilst the stock on hand at this date is 568,000 tons, against 473,000 tons 12 months ago, thus exhibiting an increase of 95,000 tons. They also show that there has been a decrease in the deliveries for home consumption of 32,000 tons, and for export foreign and coastwise of 63,000 tons, making together 95,000 tons. The following is the state of the pig-iron works in Scotland, with a list of the proprietors at this date:—

Proprietors.	Brand.	In blast.	Out.	Total.
Wm. Baird and Co.	Gartsherrie	13	3	16
ditto	Eglington	6	2	8
ditto	Blair	3	2	5
ditto	Lugar	3	—	3
ditto	Muirkirk	3	—	3
ditto	Forland	3	3	6
Merry and Cunningham	Glenarnock	5	—	5
ditto	Ardeer	4	—	4
ditto	Carnbroe	5	1	6
Coltness Iron Company	Coltness	12	—	12
Dalmellington Iron Company	Dalmellington	7	—	7
Monkland Iron & Steel Company	Monkland	9	—	9
Robert Addie and Sons	Langloan	6	—	6
Wilson and Co.	Summerlee	6	2	8
John Wilson & Co.	Dundyvan	1	2	3
James Dunlop and Co.	Clyde	4	—	4
Colin Dunlop and Co.	Quarter	3	—	3
William Dixon	Govan	—	5	5
ditto	Calder	7	1	8
Robert Stewart & Co.	Omoo	2	2	4
Shotts Iron Company	Shotts	4	—	4
ditto	Castlehill	2	1	3
Wishaw Iron Company	Wishaw	3	—	3
George Wilson and Co.	Kiln	2	—	2
Lochelly Iron Company	Lochelly	1	—	1
A. Christie and Co.	Lumphinnans	1	—	1
Carron Iron Company	Carron	3	—	3
James Russell and Son	Almond	2	—	2
C. and A. Christie	Glasmuir	1	—	1
—	Bridgness	—	2	2
Total		121	40	161

During the year the average number of furnaces in blast has been 114, producing 1,068,000 tons, being an increase of 37,000 tons over the previous year. The production per furnace has been 9370 tons, against 9500 tons in 1867, and 8875 tons in 1866. Miners have wrought comparatively steady, and their wages average 3s. 9d. per day, being 1s. below the average of last year. Of our total shipments there was sent coastwise 239,000 tons, against 255,000 tons in 1867, 288,000 tons in 1866, and 311,000 tons in 1865; foreign, 324,000 tons, against 338,300 tons in 1867, 298,000 tons in 1866, and 368,800 tons in 1865.

The subjoined table shows the proportion of the iron included in these shipments which has been taken by the several countries in each year:—

	1868.	1867.	1866.
France	57,700	60,500	74,500
Germany and Holland	125,200	99,600	85,000
Belgium, Denmark, Sweden, and Norway	22,800	20,100	20,300
Russia	14,300	9,600	6,600
Spain and Portugal	6,900	5,100	5,300
Italy	13,300	14,200	11,600
United States	76,400	117,300	55,000
British America	31,500	33,000	46,000
East Indies, China, Australia, & South America	10,900	14,000	9,000

Adding on the Clyde has been in a prosperous condition, and the figures compare favourably with former years. In 1868 there were built 193 iron vessels of 166,350 tons, against 181 of 97,500 tons in 1867, and 188 of 116,996 tons in 1866; and there are now building 118 iron vessels of 133,950 tons, against 113 of 112,360 tons in 1867, and 84 of 70,000 tons in 1866. At the present moment the malleable iron works, foundries, and shipbuilding yards on the Clyde are generally well engaged, with the prospect of an increasing demand, and better prices than have been current during the past year. We sincerely hope that the coming events will not mar the happy augury of good which is casting its bright shadow before.

RAILWAY FACTS.—The number of miles travelled by railway trains in the United Kingdom in the year 1867 was 143,542,827. Upon an average, therefore, 41 miles were covered by trains in every second of time. The length of line open at the end of the year was 7844 miles of double lines and 6403 miles of single, the total length of railway being thus 22,091 miles. In five or seven years the extent of line will, probably, be such that it would reach round the globe. Adopting an estimate which has been made, that the season and periodical ticket-holders travelled upon an average about 350 times each upon their ticket, the total number of passengers carried in the year in the United Kingdom exceeded 329,000,000, or more than 900,000 per day. The number averages 11 journeys in the year for every man, woman, and child in the kingdom. The returns rendered appear to count more than once any passenger who in his journey travelled over the line of more than one railway company; but such cases are a small minority. Eleven passengers in 100 travelled first-class, 27 second-class, 62 third-class. Ten years before, in 1857, 13 travelled first-class, 31 second-class, 56 third-class. The railway has been more thrown open to the masses; 178,000,000 people travelled

third-class in 1867. If the 329,000,000 passengers in that year saved 200,000,000 hours by travelling by railroad instead of by common road, the saving of time was equal to 22,815 years.

The Royal School of Mines, Jermyn Street.

MR. WARINGTON SMYTH'S LECTURES.

[FROM NOTES BY OUR OWN REPORTER.]

LECTURE XIV.—Continuing the subject of boring, Mr. SMYTH said—The implements used in that operation down to moderate depths are of the simplest kind, but requiring for their construction the best of material, and a great amount of care on the part of the borer and of those who have to deal with them. I have already shown you that in lifting the boring-tool a spring lever pole may be used with great advantage, but other methods are employed when the depth to be attained grows more considerable. I, therefore, propose to-day to allude chiefly to the apparatus used for those deep bore-holes and some of those varieties which have within the last few years been brought forward where it is proposed to employ steam-power to the working of rods. Steam-power is commonly employed by the intervention of a lever of the first order, at the end of which a chain is suspended, to which the boring-rods are attached. Whenever an apparatus of this kind comes into use it is usual to employ a pulley-frame. (Several models were exhibited by the lecturer.) Another mode is that in which a turn or two is taken around the barrel of a windlass, and a man holds the slack of the rope, and, by letting it go, permits the tool to fall, and give the stroke. This operation may be carried on with much greater uniformity than some people would suppose, but the great wear and tear of the rope which it involves is a great objection. The principle of different kinds of levers is much the same, although its application is varied greatly to suit the convenience of the borers and the peculiarities of each case. Amongst the most approved and successful boring apparatus now in use are those of Messrs. Deguer and Laurant, Messrs. Kind and Son, two most celebrated bore-masters, and Messrs. Dru and Mulot. I mention these names particularly, because they have been engaged in the construction of some of the deepest bore-holes in Europe, and I probably shall have to refer to them again. When the operation is carried out with any degree of nicety or to any great depth the principal thing is to ensure perfect perpendicularity. For this purpose it is usual to sink a pit for a few yards, so that the men may within those limits put down certain guides, and so get the means of keeping the rods quite straight; or they may build a scaffold of some height over the hole, and confine the motion of the rods between guides, so as to make the direction of the stroke as perfect as possible. These guides are generally simple enough, often consisting of two blocks of wood, with a small hole at their junction, sufficient to let the rod pass through. This not only helps to keep the perpendicularity, but is useful in preventing anything falling into the bore-hole.

Another point of which it is impossible to exaggerate the importance, and particularly as the hole gains depth, is the length of the rods. If small boring-rods, of 3 ft. or even of 6 ft., are used a great expenditure of time will take place in their removal to clear out the hole. Many hours are lost in each day in unscrewing and screwing the rods; and, consequently, it has long been an object with engineers to lengthen them as much as possible. It is obvious that if by erecting a stage over the bore-hole 30 ft. can be extracted at a time, instead of 3 ft. or 6 ft., a great saving of time is effected. It is customary, indeed, to carry these stages much higher—oftentimes to as much as 50 ft. or 60 ft. above the ground, and by this means such a length can be drawn out as is consistent with the least loss of time. As the bore-hole increases in depth the simple weight of the rods becomes a very serious evil. Taking the rod at the rate of 22 lbs. the fathom, you have, with a fall of 100 fms., 2200 lbs. to lift at every blow, and to lift that by manual labour would be out of the question. It is true that if the bore-hole be full of water some of the weight is taken off, but still dealing with such a heavy weight of rods is a great drawback; and if we consider that instead of 100 fms. the bore-hole may be 200, or 300, or even 500 fms. deep, as at Crenozot, it becomes a most serious matter. Another difficulty arises from the fact that the continual hammering of the tool at the bottom of the bore-hole produces an amount of vibration which changes the character of the iron, and which, although at first of the highest excellence, may, therefore, become extremely brittle. From this cause rods have been known to break most unexpectedly, and the same misfortune also happens from injury done to the rods themselves in the bore-hole, by reason of their flexibility, or to the sides, portions of which are sometimes found to fall in. When anything of this kind happens there is, of course, a tendency to wedge in the tool, exceptional force is exerted to draw it out, and then the rods break. Supposing, then, that the rod from one or other of these causes be broken, what is best to be done? This is a difficulty of such gravity that it is not surprising that various, and sometimes ingenious, methods are added to extract the broken rod, because the fracture itself may be of different kinds, and the position of the broken end a very different thing but easy to deal with. In the simpler cases an instrument is employed called a "crow's-foot," which catches hold of the end and draws it up; or if the top of the rod stands up free in the bore-hole a hollow screw will sometimes secure it. Indeed, for such cases there are a great number of implements and contrivances, and frequently the difficulty is surmounted without much trouble. When the fracture, however, occurs in such a manner as to set all these devices at defiance it becomes necessary to break up the rods by a cutting tool, armed with the hardest steel, and then get out the broken pieces. There are occasions which will call into play in the highest degree the ingenuity, contrivance, and perseverance of the bore-master, as it is often necessary to devise a set of tools on the spot to meet a special case or difficulty. In these instances the skill of the bore-master will also be tested in determining the nature of the fracture, and the position in which the lost piece is left, as a mistake in these respects might render it utterly inextricable, whereas with proper treatment at first extreme measures might have been unnecessary. Extreme cases, however, unfortunately, are not rare, in which the loss of time and the amount of labour expended in repairing the mischief are most serious. In indeed, the work itself is not irretrievably ruined. One of the most remarkable instances of this kind occurred in the boring at Kentish Town, which I may mention, by the way, was unsuccessful. It was intended to go through the London clay, and other beds, in order to obtain the excellent water which is plentifully yielded by the green sand formation. They got, however, into a variety of shales and hard deposits of a very coarse character, which geologists said had no business to be there. At about 100 feet down one of the clearing tools broke, and it was found impossible to extract it by any means that could be devised, till at length they determined on cutting it to pieces by large chisels of steel. This took months to accomplish and to get up the pieces, and it was with great satisfaction that Mr. Deguer was able to announce the finale of whole when the last piece was brought up. This sort of *tour de force* shows what can be done by these experienced men, although what they operate upon is so far removed from sight as the bottom of a bore-hole 100 feet deep.

Amongst other contrivances by which the difficulties attendant upon sinking deep bore-holes have been sought to be overcome is that of lessening the weight of the rods by the use of hollow tubes. Von Eynhausen, a Prussian officer, has introduced hollow rods with a greater degree of perfection than anyone else. He was engaged in the direction of a bore-hole near Salzburg, in North Germany, where at the very great depth of 2220 ft. they were working, until this introduction of hollow rods, with strong, heavy rods to give action to the boring-tool. The rods being 2220 ft. in length, the weight of 2130 ft. was reduced to 4½ lbs. to the foot, making a weight of 9585 lbs. Then the other 90 ft. nearest to the cutting-tool was left solid, at 18 lbs. to the foot, weighing 1620 lbs., and thus making a total weight of 11,205 lbs.; and one-eighth being deducted on account of the water in the bore-hole, leaves the net weight to be raised at 8984 lbs. In this case the plan was adopted of not making the rods all through of the same thickness. A certain weight is wanted to give the blow sufficient force to break the ground, but there is no reason why the rods should be heavier than requisite for the strength needed to lift the lower portion, and, consequently, it is following a right principle to make one part of heavy rods and the other part of light rods. There results, from the action of striking with these great lengths, considerable vibration, and the boring-tool is thereby delayed in its progress downwards—that is, it does not strike with anything like the force its weight multiplied by the distance it is allowed to fall would give. It was, therefore, sought to obviate this by making the lower lengths heavier than those of the upper part, interfering as little as possible with the full operation of the cutting-tool. The hollow rods introduced by Eynhausen furnish this sort of comparison—1898 ft. of hollow rods, weighing 100 lbs. to the 30 ft., gives 6282 lbs.; 232 ft. of lighter rods, at 135 lbs. to 30 ft., gives 1044 lbs.; which with 90 ft. of heavy rods, 120 lbs. gives a total of 8990 lbs., or a gain of 2215 lbs., or nearly 1 ton, as compared with the previous rods when weighed in air. When weighed in water the difference is still more remarkable, and shows the gain to be 2915 lbs. In most cases the water is more or less charged with the powder and the terials in suspension, and, in this instance, the specific gravity of the water being thus increased the gain would probably be at least 3000 lbs. This was regarded a very considerable success. There is, however, the difficulty of making hollow tubes air-tight; but, as in this case they proved so successful, the idea must be admitted to be feasible. Another plan, and one which has met with most approval, is to make the rods of wood, fitting at the ends into sockets of iron, and secured by screws. These, of course, weigh a great deal less than iron, especially in water, and so far, are an advantage. These are handled exactly in the same way as the wrought-iron rods are used, and have proved a great advantage in the remarkable bore-holes sunk at Louisville, at St. Louis, and at other places in the United States, to a depth of more than 2000 ft. The lecturer here drew attention to the comparative table of the depths of the principal shafts and bore-holes in the world:—

Shafts.	Depth.
Köthenberg, Germany.	—
Röhrbach, Tyrol.	—
Samson, Harz.	—
Tresavean, Cornwall.	—
Monkwearmouth, Durham.	—
Dukinfield, Cheshire.	—
Gilly, Charleroi.	—
BORINGS.	
Mondorf, Westphalia.	—
St. Louis, United States.	—
Louisville, ditto.	—
Grenelle France.	—
Crenozot, ditto.	—
Trafalgar-square, London.	—
Kentish Town, ditto.	—

Amongst the most remarkable bore-holes at present in progress, there are none which surpass in interest those now being sunk in Paris by two eminent firms, for the purpose of giving an additional supply of water to that city. I had the pleasure of examining the works some time ago, and the whole of the arrange-

ments, and the implements and methods employed, are the most perfect and complete ever witnessed. You are all familiar with the celebrated Artesian well at Grenelle, by which the water-bearing strata have been reached, and the water rises up a pipe to a considerable height. A second well was carried out at Passy, which, on the whole, was not so successful, and it was determined to sink two others, one at Chapelle, on the extreme north, and the other at Butteaux, on the extreme south of Paris. The bore-hole at Passy was started at a width of no less than 1 metre, or nearly 3 feet in English. It was carried down to a depth of about 200 feet, when difficulties arose with respect to the lining, but eventually the enterprise was rewarded by such an enormous influx of water, as to encourage the Government to direct the present operations to be commenced. Of the two new bore-holes, one has a diameter of 4 feet, and the other of 5 feet, so that they are like small shafts, and the apparatus are worked with strong wooden rods, 10 metres, or 60 feet long, so that the loss of time in screwing and unscrewing is reduced as much as possible. In both these cases, another class of apparatus comes into play, which has been of great use in producing the full effect of the blow at the bottom of the bore-hole. I allude to what is called the free-falling borer. The boring-tool, by this plan, being detached from the rod, and allowed to fall free, the vibratory action to which I have referred, which affects so much the efficiency of the stroke and the texture of the iron of which the rods are composed, is avoided. The tool having given the blow, the rod is lowered upon it, seizes it, brings it up to the required height, and again lets it fall. There are several ways of doing this. The first was suggested by a Prussian officer of engineers, named Bosc, but the one now most in use is that invented by Mr. Kind. The apparatus in use at the Paris bore-holes are modifications of these borers. The lecturer concluded by lengthened descriptions of the mechanical contrivances for releasing and regaining the cutting-tool, illustrated by drawings and references to models, of which there are many in the Jermyn-street Museum.

LECTURE XV.—Notwithstanding all the improvements which have been made in the apparatus for boring, the progress of operations of this kind must necessarily be very slow, so that, taking even the cases in which the free-falling borer is employed, the speed at which progress is made is often not more than a few inches a day. There are, of course, exceptions. In the bore-hole in the south of Paris a speed has sometimes been obtained of 3 ft. per diem, but it has been when they have been boring through chalk, which, although moderately hard, yields more rapidly to the blows of a cutting tool 3 tons in weight, having the advantage of a free-falling apparatus, than some other kinds of rock would do. Many efforts have been made by engineers and inventors to obtain greater speed in bore-holes of moderate diameter and depth. In 1844, Mr. Beart, in London, and since then M. Favre, a Frenchman, suggested the substitution, instead of a solid iron cutting tool, of a tubular borer lifted by tubular rods, the whole being screwed together so as to make it pretty firm, almost as much so, in fact, as if it were solid. The object of this was to allow water to be pumped down from the top, which, escaping at the bottom of the tube, would be sufficient to force the debris from the bottom and carry it upwards in a continuous stream to some point where an efflux could be established, or even bring it to the top, and so render screwing and unscrewing unnecessary. It has also been proposed to reverse the motion of the stream, forcing it down the outside and up the interior of the tube with the same result. This has been tried in France with a remarkable amount of success, but under ordinary circumstances the shock of the blow would so shake all the joints as to render this plan a somewhat doubtful one. However, in one remarkable instance in the South of France, at Perpignan, a bore-hole was sunk in 23 days to no less a depth than 170 metres by this method, which in a not very hard rock would, in the ordinary way, have occupied a year. There are evident difficulties in the way of the adoption of this plan of boring. Perhaps, for instance, water might not be procurable near the spot, or the boring might be through very absorbent strata, in which case the water, instead of rising to the top, would pass away and leave the debris behind. Then, again, in the case of a stone falling down from the side on the cutter and jamming it in, there would be great difficulty in withdrawing the tubes. On the whole, therefore, there are objections enough against the method to prevent its being generally employed.

Amongst other plans of boring there is one now very much employed, which we owe to the Chinese, and that is with ropes instead of rigid rods. French missionaries and Dutch travellers in the 17th century had observed that the Chinese had methods of boring to enormous depths. Fastidius, a French missionary, having made a communication to the French Academy, to the effect that the Chinese borers had attained a depth of 3000 ft., a great deal of debate ensued upon it, and the statement was much discredited. Eventually, later travellers brought the details, which established the fact; and when we see what has been done in France and elsewhere by means of rope-boring the Chinese successes do not appear at all improbable, and now it is a matter of discussion whether it is not a method which will compare well with any of the more modern ones. The ropes used by the Chinese are made of strips of bamboo, and the Chinese borers are the ordinary hempen or wire-ropes. In consequence of the greater elasticity of ropes, it becomes necessary to give a longer stroke at the top, so that for a stroke of 10 ft. at the bottom it is necessary to give one of 20 ft. at the top. The tool used ranges from 3 cwt. to half a ton, and that weight, by its impact at the bottom of the hole, is found to do good work. The torsion of the rope is sufficient to alter the position of the blow, but it is generally found better to give the motion rather than to trust to that which may be said to be accidental.

It is here described with great minuteness several implements and cutters used for particular purposes, or to produce particular results. It is impossible to speak too highly of the skill and address displayed by many of the bore-masters to extract actual samples of the ground cut through. These samples the French call *carottes*, and the instrument by which they are obtained has a cylindrical edge. By this means it cuts all around the side of the bore-hole, leaving the centre or core standing up in the middle. When a sufficient length has been so isolated from the sides the tool is changed for one with movable teeth at the bottom, and which, gradually cuts through, and then the edges are brought up in a piece. Lengths of 2 ft. and even 3 ft. are sometimes obtained and are often extremely valuable, as showing not only the nature of the beds but the planes of stratification, running through the specimen, and thus obviating the necessity of sinking another bore-hole, or perhaps two, to ascertain this point. The methods of lifting are very similar to those used in the case of rigid rods. The Chinese employ either our common spring pole, or a rope passed round an enormous cylinder 50 ft. in diameter. It was by means of this cylinder, and counting how many times the rope went round it in drawing up the tool, that they enabled the missionaries to ascertain the depth of the borings. They took the circumference of the drum, and then found that the rope went 52 times around it, which gave the great depth they have assigned to these works. This method of boring seems to possess such great advantages that at first sight it seems wonderful that it is not universally employed, but the truth is that it has also many drawbacks. Some years ago a French engineer commenced to sink an Artesian well, and reached a depth of 600 ft., but the attempt proved a failure. And for this reason—the rope broke, and the tool attached to it could not be extracted from the bore-hole. Another great difficulty in boring with ropes is the risk of the perpendicularity of the hole. In many districts there is a remarkable succession of different sorts of beds. In some the sides are apt to fall away, and pebbles to get into the bore-hole, which then is very liable to diverge from the perpendicular, and will be sure to end in failure. Again, a sudden transition from hard to soft material is likely to produce deviation. It has been suggested that a lining would obviate difficulties of this kind, and an engineer, at Paris, asserted in a case in which the work was done by a rope that a pipe put in to a depth of 600 ft. might be turned and moved by the hand of one man, so perfectly true was the side of the bore-hole. Some of the ropes used in the case of the bore-hole at Paris were of wire-ropes. Twenty years ago I saw a bore-hole in Hungary, in an extremely hard rock, in which a flat wire-rope had been employed with entire success, and since that time ropes of that material had been frequently employed in the Harz.

Amongst the various inventions which have been applied to the various processes of boring, the apparatus of Messrs. Mather and Platt may be mentioned as having done excellent work in several localities, and particularly at Midleborough, in a boring in search of rock salt, in which a flat wire-rope was employed. The cost of the application of steam-power to the borer has proved its use in many instances; but that has been much modified by this invention. The motion of the cylinder up and down is arranged so as to give the percussion at the bottom of the bore-hole, and the cutting part is made by each blow to revolve over a certain segment of the circle. The withdrawal of the cutting-tool may be effected with a great deal of celerity, the steam-engine being close at hand; and the rope being wound up and passed round a drum the tool is removed, and the sludge put in, so that all the danger of screwing and unscrewing is avoided. Messrs. Mather and Platt's system may, therefore, be ranked amongst those that have been successful, and the only questions at issue between rope-boring and rigid rods is that in difficult ground there is with the former less command over the boring-tool at the bottom, and in case of fracture the results are more serious. In the remarkable bore-holes at Paris which I have mentioned, where the diameters are severally 4 and 5 ft., and where they have descended 2000 ft., they have avoided the use of the rope, and adhered to that of rigid rods, in spite of all the saving of time and the greater convenience of the former in raising and lowering.

Bore-holes are sometimes, and for various purposes, fitted with a lining. It is necessary occasionally to prevent the sides from falling in, and thus always to keep them open, and at others to keep out water where it is not wanted. On the Continent it is usual to put down a series of tubes for the temporary purpose of keeping open the sides while the boring is going on, and ultimately to put in a more permanent lining. In the olden time they put in wooden tubes, which have been found so durable that there are specimens made by the Romans yet to be found in existence where they have been thoroughly under water. The great objection to wooden lining is that it is necessarily so thick as greatly to reduce the available circumference of the bore-hole. This evil is obviated by the employment of metallic lining, cast-iron being a good deal used, although it is heavy and unmanageable, and liable to corrosion. For these reasons wrought-iron has been preferred to cast-iron, and is now mostly employed, as combining thinness and lightness with a requisite amount of strength. Great care must be taken not to use lining which is too light, as in that case the outward pressure will cause it to bulge in, and thus create a serious difficulty. [A number of specimens, many of which had been actually employed, were exhibited, and the deficiencies of some that had been pointed out.] In the case of the Artesian well now being at Paris the lining is made in lengths of several feet, which are screwed together. Very beautiful and perfect specimens of this sort of lining were exhibited by the French engineers at the Exhibition of 1862 and last year at that of Paris. Those of the great 5 ft. diameter boring on the north side of Paris are made of wrought-iron, and of double thickness all the way down, having to resist a pressure of material as well as water. In some cases zinc or galvanized iron has been tried with success, and occasionally gun-metal, when the corrosive action of mineral waters has had to be resisted.

With regard to the cost of boring, it must have long been obvious to you all that the expense must increase very fast as the depth increases. The same price per fathom evidently could not be maintained all the way down, and hence it is usual to be guided by a sort of tariff. In the Newcastle district, for instance, the first 5 fms. will be sunk at 7s. 6d. per fathom, the second at 15s., the third at 22s. 6d., and so on, increasing 7s. 6d. at every new length of 5 fms. This will be found very much of a piece with what it would be if the men were employed up to 150 metres (a metre being 3·28 ft. English), 12s. per metre from 150 to 400, 8s. per metre from 400 to 500, and beyond that 12s. per metre. In this country

when the boring comes to anything excessively hard, or, as they call it, "whin," it is made the subject of an exceptional bargain. It may not be the true "whin," but any rock unusually hard or troublesome at once given that name.

One or two other points with reference to securing shafts and bore-holes against water may be mentioned. Some years ago it was proposed by one or two Prussian officers in Westphalia that, instead of sinking shafts, bore-holes of unusual diameter—forming, in fact, a shaft—should be sunk when the water could not be conveniently kept out; but Mr. Kind was the first person who actually carried out a bore-hole of extremely large diameter, and it is 20 years ago since he took out a patent for his apparatus, but the movement has gone on, until now we have them from 4 ft. to 16 ft. across, and carried to various depths. The great difficulty in large bore-holes appears to be keeping up the sides in passing through very watery beds, and for this very strong lining is required. On the whole, however, they may be said to have been successful in places where no amount of pumping or of expenditure would have enabled the engineers to put down shafts properly so called. In the Great International Exhibition at Paris last year there were exhibited the tools used in sinking two shafts at the collieries of St. Avelin and L'Hopital, in the Department of the Moselle. The ground (in the New Red Sandstone) was there expected to be very watery, but it was not determined at first to adopt the expedient of boring. The diameter of the shaft was 13 ft., and when they had descended 400 ft. the difficulties of the ground became so great that they continued the shaft by means of an immense boring-machine, and the operation was perfectly successful.

In conclusion, I will refer very briefly to the causes why in future it will become more and more important that mining engineers should be acquainted with the various apparatus used by borers. The principal reason is that boring will inevitably be brought into play in many subsidiary operations in which it is now but seldom thought of. Another reason is that we are fast exhausting such of our mineral repositories as are near the surface, and the best methods of approaching those at greater depths are more and more important. Thus, as regards coal, as we find it necessary to go to places where the mineral is covered with the rocks of newer date, it will be very uncertain whether we may find it at all, and, therefore, no prudent person will go to work without testing the ground by boring. A notable instance of this kind has occurred at our own doors. At the Shirebrook Colliery, in North Nottingham, commenced by the late Duke of Newcastle, a very great depth indeed had to be sunk before they reached the coal measures at all. The upper beds all around are Red Sandstone and limestone, and before any coal was reached the sinking was carried to so great a depth that if the ground had not been previously tried the attempt might have been abandoned, and the outlay sacrificed. In this case, however, before sinking the ground was proved by boring, and at last, below the Red Sandstone, they came upon a bed which afforded a clue to the thick seam of coal they wished to find, and they calculated that at a certain depth below that seam existed. They persevered, and they found the thick coal not half-a-dozen feet from where it was expected to be. Here, then, is a fact that at some distance from the coal measures a clue was obtained by boring to the continuation of a well-known valuable seam; and this kind of operation will have to be applied more and more to countries and districts in which the surface gives but little indication as to what exists below.

FOREIGN MINING AND METALLURGY.

The French iron trade continues to be distinguished by much firmness; the current orders received maintain a certain activity, and their importance often exceeds the ordinary average. In the Meurthe and the Moselle refining pig continues in good demand, and transactions are not concluded at less than 27, 12s. per ton, on trucks at the producing works. On the other hand, the orders received for merchants' iron are not so important; prices are, however, maintained, and small supplies being generally held, an advance is looked for. Switzerland has sent some good orders to French houses of late. Orders have also been received in the Moselle for the plant required for lines of local interest in the Meurthe district. It is stated that the house of Wendel intends to carry out in one of its establishments a new process for the production of Bessemer's steel. It is studying at present in England. In the Haute-Marne rolled iron from charcoal-made pig is quoted at 91, to 92, 4s. per ton; mixed ditto, 81, 12s. to 81, 16s.; coke-made ditto, 71, 12s. to 71, 16s.; first-class sheets, 91, 2s. to 91, 16s.; charcoal-made puddled machine iron, 91, 8s. to 91, 16s.; coke-made machine iron, No. 20, 81, 4s. to 81, 12s. per ton, &c. The two Rehon blast-furnaces have been closed, for the purpose of carrying out repairs in them. Mention is made of a contract for 1000 tons of pig for refining at 21, 13s. 8d. per ton, free at Arras. The Pont-a-Mousson furnace is just recent from the Marne district has appeared on the Hayange. No more merchant iron from the Marne district has appeared on the Moselle market. The Abailville forges are forwarding a good deal of iron into the Metz district, in which one meets also with the machine iron of Euralville and Commercy. The Burbach works, near Sarrebruck, give a dividend of 4s. per share for the past exercise; an important addition has also been made to the reserve. The industrialists of the Ardennes district are seeking for the canalisation of the Moselle throughout its passage through the department of the Ardennes. The industrialists of the Longwy district are about to make a treaty with those of the Ardennes, in order to solicit at the same time the canalisation of the Chiers; Liège coke might then come by water from Liège to Longwy. The Northern of France and the Western of France Railway Companies have just been authorised to modify their common tariff applicable to the conveyance of coal and coke. The modification is in the direction of reduction.

The state of the markets for pig has improved of late in the principal Belgian metallurgical groups; the trade cannot yet be said to be prosperous, but everything leads to the conclusion that a serious revival in affairs is not far distant, if nothing arises to check and impede the general arrangements. Importations of English pig, which acquired a real importance last year, display a decided tendency now to decline, and the current Belgian production is disposed of without any very great difficulty. As an illustration of this, it may be noted that the Ougrée Blast Furnace Company has three furnaces at work, and has sold in Austria for next year all that the Belgian markets may leave disposable. Pig is quoted as follows in the Belgium market:—Pig for rails, 21, 8s. per ton; of commerce, 21, 10s.; for No. 2 iron, 21, 12s.; and for hard iron, No. 3, 31, per ton. The four furnaces are working with a good stock of orders, and the demand for iron is sustained. Plates in the works of the Liège group, No. 1 iron, first class, are quoted at 61, 4s. per ton; ditto, No. 2, 61, 16s.; ditto, No. 3, 71, 8s. per ton. No. 2 plates, first class, have made 81, 16s.; and No. 3 ditto, 91, 12s. per ton. The mechanical construction trade of Belgium remains less well provided for than the other departments of Belgian industry; and if the Government does not realise its promise to give out contracts, the railways will be the only source of work for the various Belgian establishments. The outlook for work for the rest of the winter cannot be pronounced satisfactory. Some orders are understood to have been received for iron bridge work. The prospects of the establishments producing rails have not improved during the last few days, as negotiations which have been for some time in progress for a contract for 35,000 tons of rails on Hungarian account have fallen through. The rupture of the negotiations is explained as follows:—The specifications prepared with reference to the Hungarian lines require that the rails should be accepted by the Government, and the Hungarian Government is not disposed to pronounce an opinion upon this until a commission appointed by it has made a report on the manufacture of rails in Belgium. The Belgian industrialists do not feel disposed to admit this singular clause in the contract. The circumstances must be regarded as a hint to Belgian producers to spare no pains to improve the reputation of their products abroad. In some calculations last week as to the productive powers of Belgian works, a total of 25,000 tons per annum was attributed to the great house of de Dordrecht, but it may be noted that 45,000 tons would be nearer the mark; it is expected also that some modifications in the tools of the works will increase their annual productive power to 65,000 tons. This correction, of course, carries the total productive powers of the Belgian works from 140,000 to 160,000 tons per annum. The amount of a contract concluded by the Acoz house for the Lemberg and Czernowitz Railway is 10,500 tons; the contract may be regarded as definitive. A new tariff adopted by the administration of the State Railways for the conveyance of coal from Charleroi to St. Ghislain is regarded as bolder and more radical than any of its kind in Belgium. There has not been much change to note during the last few days in the state of the Belgian coal markets; freights display a decidedly downward tendency.

As was recently noted, the production of steel is attracting more and more attention among Prussian industrialists. The Krupp Works, at Essen, produce now every year great quantities of cast-steel, and the same may be said with respect to the Bochum, Hoerde, Haspe, &c., works. The house of Asbeck, Osthaus, Eicklen, and Co., of Hagen, exports almost the whole of its cast-steel production to England. At Bochum a new company is in course of constitution for the production of cast-steel; the capital sought to be raised in the first instance is 32,000l., and the subscription has just been opened. At Osnabrück, again, a company is in course of formation, under the title of the Iron and Steel Works Company; the capital raised in the first instance is 96,000l., and attention is now being directed to the construction of the works, which are expected to be completed during the winter months. The company hopes to find an outlet for its production in the North of Germany. It can easily, and with little expense for transport, reach the ports of Sweden, and when the Paris, Bremen, and Hamburg line has been completed, it will also be placed within easy reach of the ports of Bremen, Hamburg, Kiel, Lübeck, &c. The Prussian rail markets have been in rather an animated state. The administration of the Lower Silesian Railway is about to proceed publicly and by sealed tenders to let contracts for 203 tons of fish-plates and 814 tons of bolts. The administration of the Nassau Railway is having made 2165 tons of iron girders, 1441 tons of steel rails, fish-plates, bolts, &c. The administration of the Berlin and Cöpen railway has ordered four passenger locomotives and two goods locomotives. The administration of the Rhenish and Cologne Railway has ordered 10 passenger locomotives; and the administration of the Upper Silesian Railway has let a contract for 200 four-wheeled open goods trucks. The aspect of the market for merchants' iron in Prussia continues good. Orders are abundant, and many works have already entered into contracts which will occupy them for the first three months of 1869, at 91, per ton, so that it is hoped prices will be quoted below that point after Jan. 1, 1869. The works may be said, in fact, to have never had so much employment on hand as at present. The state of the Prussian blast-furnaces has, however, not improved; a large quantity of foreign pig is sent into the Zollverein, and this prevents an advance in prices. Nevertheless, the blast-furnaces are working regularly, although, perhaps, at a low rate of profit.

A considerable improvement is noticed in the principal copper markets. At Havre it is in Chilean that the advance has more especially taken place. Copper from other sources has not presented very sensible variations. At Paris the market has presented much the same features as at Havre. On the German markets, although there has not yet been any notable advance, prices have hardened. A strong upward movement has appeared in tin. At Paris and Havre quotations have been only nominal for some descriptions, but there has been a rather notable advance in Banca. At Cologne, Berlin, and Hamburg tin has also displayed a decided tendency to firmness. On the Dutch markets transactions in tin have been very numerous. At Amsterdam the sale is mentioned of 22,000 blocks of Banca, at 61½ fls. At Rotterdam 92½ fls. has been paid for Banca, against 92 fls. ten days since. Little business has been passing at Elberfeld and Erfurt, and quotations have been almost nominal. At Marseilles prices have

been generally sustained, but some weakness has been apparent in lead in saumons, first fusion. There has been no change in lead quotations on the Dutch markets. Zinc has remained without any great change, but nevertheless prices have been supported.

MINING IN AUSTRALASIA—MONTHLY SUMMARY.

The Tasmanian Government has offered 5000l. for the discovery of gold in that island. It is stated that indications of the presence of the precious metal abound in many parts of the settlement.

Gold is being received at Adelaide in considerable quantities. The digging at the Barossa and Jupiter Creek gold fields was continued, while an extended area of country is now being worked, yielding average wages to those employed. At the Alameda Silver Mine new machinery has been introduced.

The great copper mines on the Peninsula are pursuing that prosperous tenor of their way which has so long rejoiced the hearts of their shareholders. Whether the Moonta and Wallaroo Companies will amalgamate, and so have an equal interest in the extensive and complete smelting-works of the latter company, has not yet been made known, but it is believed such will be the case. The progressive mines on the Peninsula are being daily developed, and they promise in time to equal the older companies in value. An extraordinarily rich pocket of ore has been discovered at Wheal Hughes, from which many thousands of pounds worth of ore will be raised at a small cost. This discovery makes the property of Wheal Hughes and Paramatta, through which the same lode runs, even more valuable than before, as it is reasoned that what has occurred to the Wheal Hughes may be to the other companies. Some other companies are also making fresh efforts, and the consequence is that men are generally able to meet with full employment.—*Wallaroo Times*.

AUSTRALIAN MINES.

YUDANAMUTANA COPPER.—The directors have received advices from the superintendent confirmatory of the captain's report, together with a remittance of 1000l. Captain Terrell (Oct. 31) reports—Billman Mine—No. 1 Winze: The lode in the bottom of this winze continues to look well; no alteration since my last. No. 2 Winze: I have been stopping down the eastern and western ends of the winze the whole month, and have turned out some good ore. The lode at present is a little disordered, although containing good ore. No. 3 Winze: I am pleased to say the lode in this place has greatly improved this month, and at the present time looking better than ever—about 10 feet wide, and 12 feet high, all good smelting work. The stopes in Big Bunch, back of the 10 and around the chimney shaft, are also looking well; no alteration from last report. I am very pleased to report that my return of copper made for this month exceeds any previous month's return—54 tons 14 cwt. 3 qrs., and a whole dispatched to Port Augusta. We still continue to make good fire-bricks. In conclusion, I am glad to say the mine is looking richer than ever, and all works going on satisfactorily.

WORTHING.—Adelaide, Nov. 10: Legg's engine-shaft is not going down so fast as we expected it would, owing to the men getting out of heart with their bargain, and some of them leaving, so that we have now only nine men sinking instead of twelve, which will throw us back in our calculation of getting to the 93. The 83 north end continues to let down a great deal of water, and is about 3 to 4 feet wide, all saving work. Price for driving, 16s. per fathom; ground driven in the past month, 17 ft. In the 73 we are driving a cross-cut to cut the slide, where it is likely we shall meet with easy ground for firing round the hard bar, and meet with the lode which it comes in contact with the slide, where it is very likely to make a good lode of ore. Should this be the case it will give us an idea of how we should proceed in the 83 south end, ground driven, 10 ft. 8 in.; present price for driving, 16s. per fathom. We have commenced to sink a winze in bottom of the 53, north of Legg's shaft, to try to get through to the 83; I think we shall be able to manage by rising part of the distance in the back of the 83, where we have commenced on a splendid lode of ore, and the ground is very easy to sink; price for 5 ft. long, within timber, and assisting the timber men to put in, 7s. per fm. When this place is holed it will ventilate this part of the mine, and give us a chance of commencing to drive levels in the 63 and 73, north of the hard bar. We have four men driving south from William's stopes, in back of the 73, on the top of the slide, in a good lode of ore, which we hope to meet with in the 73 when we cut the slide and get round the hard bar. Quantity of ore raised during the month, 140 tons; copper shipped, 14 tons 12 cwt.; ore on hand, 60 tons 9 p. cent., and regulus 17 tons of 50 per cent. Number of hands employed, 121.

PORT PHILLIP AND COLONIAL GOLD.—The quantity of quartz crushed during the four weeks of October was 5048 tons, yielding 2227 oz. 3 dwts. of gold, or a yield of 8 dwts. 19 grs. per ton. The receipts were 8241. 6s. 1d. payment, 3241. 7s. 4d.; profit, 4181. 18s. 9d.; added to which was balance from last month of 5801. 16s. 10d., thereby making an available balance of 48981. 15s. 7d. The amount divided between the two companies was 3000l., the Port Phillip Company's proportion of which amounts to 1500l. The balance of 18981. 15s. 7d. was carried forward towards meeting payments of firewood and timber contracts of, say, 6500l. The quantity of quartz crushed for the first two weeks of November was 2626 tons, yielding 1167 dwts. of gold, or an average of 7 dwts. 14 grs. per ton. Remittance, 1900l.

ENGLISH AND AUSTRALIAN COPPER.—The quantity of coal at Koorlinga was 243 tons, at Kapunda 68 tons, and at the Port Works 500 tons. The returns of furnaces at work at Koorlinga and at Port Adelaide have not come forward by this portion of the mail. At date of writing about 280 tons of copper were in course of shipment.

YORKE PENINSULA.—The operations at Kurilla Mine during the month have consisted in driving the 35, east of Hall's shaft, and in stopping the back of that level. The appearance of the lode in the 35, Capt. Anthony reports, "augurs well for further improvement." He had also caused to be driven a cross-cut through the north or hanging wall of the lode, at a point 10 fathoms from the shaft, and reports that it is "very wide and strong, and is ore throughout the whole of its length, and has been driven at a point 20 fathoms east of the shaft. He states that "the engine and pitwork are working satisfactorily, and the water charges are less," and adds, "I have about 40 tons of ore of about 15 per cent. dressed, and there are several tons of low-price ore that would be available should the price of copper rise to a fair standard."

SCOTCH AUSTRALIAN.—The directors have advices from Sydney, to Nov. 6, with reports from the Lambton Colliery to the 3d. The sales of coal for the month of October, amounted to 13,010 tons.

AUSTRALIAN UNITED GOLD.—Mr. Kitto, Nov. 9, writes:—"The whole of the operations in connection of the Duke of Cornwall Mine are progressing in a most satisfactory manner; indeed we have not had a single hitch since the works commenced. Sharp's shaft has reached a depth of 90 feet, ground still good, and charged with pyrites. A greater depth than the old engine-shaft, I shifted the pump from the latter to the former. Duke's shaft is now 125 feet deep. As soon as we have reached a depth of 140 feet I shall cross-cut to the lode, and communicate with the old shaft. Old Engine-shaft: This part of the mine is now perfectly dry. I continued a cross-cut (commenced by the original owners) from this shaft, and am happy to inform you that a splendid lode has been struck, 15 feet thick; from which we have taken several specimens of golden ore, showing, indeed without doubt that we have an almost unlimited supply of paying stone. I have caused a cross-cut to be driven towards the eastern end of the lode, in order to intersect Little's and Ferron's lodes. Engine-house: This is ready for the engine. The boiler will be set before next mail leaves. The other works are all going on well. The cashier's cottage is nearly finished." Mr. Lamb also writes:—"At the Duke of Cornwall things are eminently satisfactory. A large body of quartz has been cut through in the old shaft, the drive is being continued to intersect the lode to east of 'Little's' and so on to 'Ferron's.' Gold is visible in the quartz raised in cutting the lode above referred to (Cattle's), and by the time the machine is fixed and in working order Mr. Kitto will doubtless have a large quantity of quartz ready for the stamps. The quality of the stone already raised is very similar in character to what we saw in Hilton's shaft about a fortnight ago, and in Rowe's upon a former occasion, proving that the line of reefs is uniformly good throughout Golden Gully—in fact, I have not doubted it since my first report to your board to that effect. . . . When fully in work here I have every faith and reason to believe that we shall extract sufficient gold to cause satisfaction to our shareholders at home. In fact, we could profitably employ any reasonable amount of capital."

FOREIGN MINES.

DON PEDRO, ANGLO-BRAZILIAN, AND ROSSA GRANDE.—Messrs. John Moore and Co. advise by letter, dated Rio, Nov. 30, that the following remittances have been dispatched from the mines:—39,129 oits. for the Don Pedro Company, 7516 oits. for the Anglo-Brazilian Company, and 1938 oits. for the Rossa Grande Company. These remittances are composed as follows:—

Don Pedro. Anglo-Brazilian. Rossa Grande.

Last division of Sept., Oits. 5,721 1167 623

October produce 22,314 2875 814

Cleaned for troop 11,094 2473 596

Total Oits. 39,129 7515 1938

The agents further advise the gratifying intelligence that Capt. Thos. Treloar arrived in Rio on the morning of Dec. 2, in good health.

SAO VICENTE.—The directors have received the following letter from their agents in Brazil, dated Nov. 30:—"We avail of this opportunity to inform you that Mr. Treloar advises having discovered the Don Pedro gold troop, due here on Dec. 2, one box containing 932 oits. gold dust, which will go forward to your address by the Royal Mail steamer of Dec. 9."

UNITED MEXICAN.—Guanaxuato, Nov. 23: Mine of Jesus Maria y José: In this mine the ore continues much as usual in the deepest workings; it is low in ley, and much mixed up in barren rock. In the upper reserves of San Juan, San Nicholas, and Santa Domingo, we cannot force work, on account of the dangerous nature of the ground, and our extraction from these sources is much reduced. The buscon sales, with some variation, keep up; we have some good but narrow strips in the upper part of La Providencia and Pozo de Jesus, which the workmen accustomed to this kind of work prefer to break and poorer ore. The accounts for the month of October show a profit of \$3742. The buscon sales this month have been on Nov. 5, \$1702; on the 12th, \$1941; and on the 19th, \$1605. Mines in the Guadalupe de la Oscura District: In Encinillas the ore had fallen off in the level going southwards from El Oro shaft, but the miner brought me news yesterday that it had improved again; in the pozos it continues good. In the destajo (contract work) going north-west towards Encinillas shaft we have met with no ore yet, but the vein looks as if it might suddenly improve; the ground is more fatigued, and in the last two weeks we have advanced 10 metres, or Reduction Works: These works continue to leave good profits.—*New Mines*: San Cayetano: We have

commenced work in full earnest in the new concern. The adit is in extremely hard rock, and in October we advanced in it only 5 varas, at an expense of \$400. We are daily getting nearer the lode in the end of it, and ought to come on it near its junction with the vein of La Loba.—Buenos Ayres: In this ground I have opened a shaft with the double intention of ventilating the adit and of cutting and investigating the main lode. Our workmen have penetrated into the old mine of Buenos Ayres as far as the water will allow them, and have brought me samples of ore good both in gold and silver; but it is useless to expend our funds in partial attempts, because the adit in its advance will drain the mine, and leave us room for exploration two or three years hence.—San Antonio de Ovejuna: The shaft of this mine is reported to be 85 varas deep, and I have resolved upon continuing it downwards to the depth of the adit. This mine has yielded large quantities of ore on the surface, and in workings at a small depth I have found the lode in parts 15 varas broad from wall to wall. One portion is taken quite out, and is filled up with debris, and tradition says that the water would not allow the workmen to sink on it. By my partial surveys I think it will require a depth of nearly 250 varas to touch the main cerro (lode), and at that depth, more or less, our adit should come into the mine, and to reach it we shall have to sink between 160 and 170 varas.

MARIQUITA.—Santa Ana Mines for the month of October: The superintendent writes (under date Nov. 2) that, having received office help, he will forward by next mail a full profit and loss account for the months of September and October. The mine work during the latter month has been much impeded by several breakages which have occurred to the winding machinery; but a wire-rope had arrived on the establishment, which would effectually prevent such accidents for the future. An important improvement in the lode at the 130 fm. level has taken place, horse, which has interfered with the lode north of the new shaft all the way from 5 fms. below the 90, and which has pinched the lode down about 4 ft. In some places, has disappeared, and the lode in the bottom of the mine has opened out to 12 feet wide, between two regular walls; the lode besides has increased, which has improved in quality and character, less pyrites, and richer proper silver ores.—Marmato Mines for the month of October: Cost, \$10,755; returns, \$12,673. The superintendent writes:—"The various works are going on favourably, and the communication to be effected in the Aguacatal Mine, to which we have been looking forward for so long a time, is now near its completion.—Aguas Claras Mine for the month of October: Cost, \$2635; returns, \$2850.

IMPERIAL SILVER QUARRIES.—Lewis Chalmers, Nov. 16: Eleven and a-half feet of tunnel were made last week.

—Nov. 23: Eight and a-half feet of tunnel were made last week.

—Nov. 30: Eight feet of tunnel were made last week; rock very hard, and blasting badly.

ALAMILLOS.—Dec. 21: The lode in the 4th level, driving east from La Magdalena shaft, is small, and the ground hard for driving. The 5th level, east of this shaft, yields 1 ton of ore per fathom; the lode is very large, composed of carbonate of lime and lead ore. In the 5th level, west of La Magdalena shaft, the ground is a little easier, but the lode is unproductive. The lode in the 5th level, east of Taylor's engine-shaft, has fallen off in value within the last few days, and is now worth ¾ ton of ore per fathom. No change has taken place in the 5th level, west of Taylor's shaft. In the 4th level, west of San Andriano shaft, the lode has increased in size, and yields ¼ ton of ore per fathom. The lode in the 3d level, west of San Yago shaft, continues very regular, and contains occasionally spots of ore. In the 2d level, east of Judd's shaft, the lode is large, but is at present poor. The lode in the 3d level, east of Crosby's engine-shaft, is small and valueless. The 3d level, west of Perez's winze, has yielded some good stones of lead, but at present it is unproductive. The ground in the 2d level, west of Morris's shaft, is hard, and the lode small. The 2d level, east of Henty's shaft, produces ¼ ton of ore per fathom; the lode is still of a promising character. The 2d level, west of Henty's shaft, yields ¼ ton of ore per fathom; a cross-head has disappeared the lode, and we expect a change for the better shortly.—Shafts and Winzes: San Enrique shaft has reached the required depth for a 4th level, and the men are put to cross-cut south. Taylor's engine-shaft, sinking below the 4th level, no particular change has occurred. Victor shaft, below the 1st level, yields ¼ ton per fathom; an increase of water compels us to suspend sinking. The lode in Tomas's winze, below the 4th level, is large, and contains a little lead, but not enough to value. Aguedos' winze, which produces ¼ ton of ore per fathom, has fallen off both in size and value. Prim's winze, below the 4th level, is worth ¾ ton per fathom; the lode is very large, yielding good lumps of lead ore.

FORTUNA.—Canada Incoosa Mine: In the 110, east of O'Shea's shaft, the lode is small, producing a little lead, but not enough to value. The lode in the 100, west of Henty's shaft, is still in disturbed ground, and is, consequently, poor, yielding only ¼ ton of ore per fathom. The 90, west of Judd's shaft, yields ¼ ton of ore per fathom; the lode has declined in value in the last level since last report. The 80, west of Judd's, is worth ¼ ton per fathom; the ground is favourable for driving, but the lode is small. No change has taken place in the 80 fm. level cross-cut south since our last report. The 70, east of Carro's shaft, is worth 2 tons per fathom; this end is opening up a valuable piece of ore ground.—Shafts and Winzes: In Henty's shaft, sinking below the 100, the ground is very hard. Good progress is being made in sinking Lowndes's shaft, below the 70; the lode is worth 1 ton of ore per fathom. Diaz' winze, below the 55, yields 2 tons per fathom; this winze is communicated to the 70 fathom level.—South Lode: The 50, east of San Pedro shaft, produces ¼ ton per fathom; the lode is large, composed of quartz and lead ore. The lode in Casado's winze, below the 40, is similar in character to the ore just described, and, like it, yields ¼ ton per fathom.—Los Salidos Mine: The 100, west of Morris's engine-shaft, yields ¼ ton of ore per fathom; the lode, being near a strong cross-course, is split into small branches. The 75, west of Buenos Amigos shaft, is worth 2 tons of ore per fathom; the lode is divided into two branches, which are compact and solid. The lode in the 100, east of San Gabriel shaft, is broken up by cross joints. The lode in the 90, east of Cox's shaft, produces 1 ton of ore per fathom. In the 75, east of San Pablo's shaft, the lode is large and strong, composed of calcareous spar, quartz, and lead ore; yielding of the latter ¼ ton per fathom.—Shafts and Winzes: Buenos Amigos shaft, sinking below the 90, is worth 1 ton of ore per fathom; the men are getting on as fast as possible with this shaft. In the 70, below the 75, the lode, which yields ¼ ton per fathom, looks much better than for some time past. Tomas' winze, below the 65, produces ¼ ton per fathom; the lode is strong and kindly, composed of carbonate of lime and lead ore. Prim's winze, below the 90, yields 1 ton per fathom; the lode in this winze has greatly declined in value since last report.

LINARES.—Dec. 19: West of Engine-shaft: In the 110 fm. level, west of San Tomas engine-shaft, the lode is disarranged and poor. The 85, west of Warne's shaft, yields ¼ ton of lead ore per fm.; the lode is large and strong, and lets out a quantity of water. The lode in the 85, east of Warne's shaft, produces ¼ ton per fm., and the ground is more favourable for driving. The 80, east of San Francisco shaft, the lode is very firm and compact, and yields 2 tons of ore per fathom. The lode in the 31, east of above shaft, has declined a little in value during the past week, and now yields 1 ton of ore per fm.—East of Engine-shaft: The 95, east of Taylor's cross-cut, produces 2 tons of ore per fathom; this end is opening good tribute ground. In the 95, east of Taylor's shaft, the lode is very wide, and contains a little lead.—Shafts and Winzes: In San Francisco shaft the lode has declined in value during the last few days. The lode in No. 163 winze, below the 95, is small and poor. No. 182 winze, below the 31, yields ¾ ton of ore per fm.; the lode is very regular, consisting of quartz and lead ore. No. 164 winze, below the 25, is going down in a very promising lode, worth 1 ton of ore per fm.—Quinto's Mine: In the 32, west of Taylor's engine-shaft, there is a small vein of ore in the upper part of the end. The lode in the 32, east of Taylor's shaft, yields small stones of lead. In the 32, east of Addie's shaft, the lode, which yields ¼ ton of ore per fm., is moderately productive for about half the height of the end. The lode in the 32, west of Addie's shaft, is large, strong, and well exposed with ore.—Shafts and Winzes: In Taylor's engine-shaft, sinking below the 32 fm. level, the men are working very diligently, and good progress is being made. The ground in Cox's shaft, sinking from surface, is getting harder. San Carlos shaft, below surface, yields 1 ton of ore per fathom. The flat-rods are working remarkably well, and the water is easily kept out. The men are doing good labour in sinking. Old workings are met with in the east end of the shaft, and the excavations are extensive. There are pieces of the lode left by the "old folks" worth 1½ ton per fathom. Having completely mastered the water, we expect to get on fast with this work.

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